Amendments to the Claims

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

1. (previously presented) A method for determining transducer velocity profiles in a disk drive, for use during normal non-park operations, comprising:

determining a first transducer velocity profile in a first direction away from a park position;

determining a second transducer velocity profile in a second direction, wherein said second direction is a direction towards said park position;

adjusting said second transducer velocity profile, without the need to adjust said first transducer velocity profile, wherein said second transducer velocity profile is adjusted such that a ramp tab does not hit a crash stop at a velocity which might cause mechanical damage to said disk drive when said disk drive loses power during operation while a seek is in progress.

2. (original) A method, as claimed in claim 1, wherein said adjusting step includes:

adjusting a current of a deceleration portion of said second transducer velocity profile in an amount sufficient such that current available from a back electromotive force of a spindle motor will decelerate said transducer in an amount sufficient such that said ramp tab does not bounce off of said crash stop and back over a rotating storage medium when said disk loses power while a seek is in progress.

3. (original) A method, as claimed in claim 1, wherein said mechanical damage includes:

damage to a surface of a rotating storage medium which might result in loss of data stored on said rotating storage medium.

4. (original) A method, as claimed in claim 1, wherein said mechanical damage includes:

damage to said crash stop or damage to said ramp tab.

5. (original) A method, as claimed in claim 1, wherein said adjusting step includes:

adjusting a current of a deceleration portion of said second transducer velocity profile by a predetermined amount.

6. (original) A method, as claimed in claim 5, wherein said predetermined amount is approximately 50 percent.

7. (original) A method, as claimed in claim 1, wherein said adjusting step includes:

adjusting said second transducer velocity profile by a variable amount.

8. (original) A method, as claimed in claim 7, wherein said adjusting step includes:

calculating said variable amount based on at least one of a target track, power supply voltage, temperature, spindle motor back electromotive force, and positioner gain.

9. (previously presented) A method for determining transducer velocity profiles in a disk drive, comprising:

determining a first transducer velocity profile in a first direction;

determining a second transducer velocity profile in a second direction;

adjusting said second transducer velocity profile in an amount sufficient such that a ramp tab does not hit a crash stop at a velocity which might cause mechanical damage to said disk drive when said disk drive loses power during operation while a seek is in progress;

wherein said adjusting step includes adjusting said second transducer velocity profile by a variable amount,

wherein said variable amount is a derate factor calculated using the equation:

$$Derate\_factor = \frac{(\max\_track - tgt\_track)^2 \times 127}{2^{26} \times \sqrt{2a}} + 0.5$$

where *max_track* is the number of the maximum track, *tgt_track* is the number of the target track, and *a* is the deceleration of the transducer according to said deceleration portion of said velocity profile.

10. (original) A method, as claimed in claim 8, wherein:

said adjusting step further includes calculating a warping factor and applying said warping factor to said second transducer velocity profile.

11. (original) A method, as claimed in claim 10, wherein:

said warping factor is determined based on at least one of a seek length, a transducer velocity, and a voice coil motor back electromotive force.

12. (previously presented) A method for determining transducer velocity profiles in a disk drive, comprising:

determining a first transducer velocity profile in a first direction;

determining a second transducer velocity profile in a second direction;

adjusting said second transducer velocity profile in an amount sufficient such that a ramp tab does not hit a crash stop at a velocity which might cause mechanical damage to said disk drive when said disk drive loses power during operation while a seek is in progress;

wherein said adjusting step includes adjusting said second transducer velocity profile by a variable amount,

wherein said adjusting step includes calculating said variable amount based on at least one of a target track, power supply voltage, temperature, spindle motor back electromotive force, and positioner gain,

wherein said adjusting step further includes calculating a warping factor and applying said warping factor to said second transducer velocity profile,

wherein said warping factor is determined based on at least one of a seek length, a transducer velocity, and a voice coil motor back electromotive force, and

wherein said warping factor is determined according to the following equation:

$$Warp\_factor = \sqrt{2a} \times \sqrt{(1 + Kwarp \times Vel) \times xtg}$$

where *a* is the deceleration of said transducer according to a deceleration portion of said seek velocity profile, *vel* is the velocity of the transducer, *xtg* is said seek length, and *kwarp* is a variable determined by the amount of said voice coil motor back electromotive force.

13. (previously presented) A disk drive, comprising:

a storage disk having a plurality of concentric tracks for storing data;

a spindle motor for rotating said storage disk;

an actuator arm assembly having a transducer for reading data from said storage disk and having a ramp tab;

a ramp operable to engage said ramp tab and prevent said transducer from contacting said storage disk when said storage disk is not rotating, said ramp having a crash stop located at a distal end of said ramp;

a voice coil motor operable to move said actuator arm relative to said storage disk from a starting track to a target track according to a first velocity profile in a first direction toward said ramp and a second velocity profile in a second direction away from said ramp in response to a control signal; and

a controller operable to generate said control signal and deliver said control signal to said voice coil motor such that said first velocity profile is limited, during normal non-

park operations, without the need to limit said second velocity profile, such that said ramp tab does not hit said crash stop at a velocity which might cause mechanical damage to said disk drive when said disk drive loses power while a seek is in progress.

14. (original) The disk drive, as claimed in claim 13, wherein said mechanical damage includes:

damage to a surface of said storage disk which might result in loss of data stored on said disk.

15. (original) The disk drive, as claimed in claim 13, wherein said mechanical damage includes:

damage to said crash stop or damage to said ramp tab.

16. (original) The disk drive, as claimed in claim 13, wherein:

a current required for a deceleration portion of said first velocity profile is derated by a factor of approximately 0.5.

17. (original) The disk drive, as claimed in claim 13, wherein:

said first velocity profile is derated by a variable amount.

18. (original) The disk drive, as claimed in claim 17, wherein:

said variable amount is determined according to at least one of said target track, a power supply voltage, a temperature, a spindle motor back electromotive force, and a positioner gain.

19. (previously presented) A disk drive, comprising:

a storage disk having a plurality of concentric tracks for storing data;

a spindle motor for rotating said storage disk;

an actuator arm assembly having a transducer for reading data from said storage disk and having a ramp tab;

a ramp operable to engage said ramp tab and prevent said transducer from contacting said storage disk when said storage disk is not rotating, said ramp having a crash stop located at a distal end of said ramp;

a voice coil motor operable to move said actuator arm relative to said storage disk from a starting track to a target track according to a first velocity profile in a first direction toward said ramp and a second velocity profile in a second direction away from said ramp in response to a control signal; and

a controller operable to generate said control signal and deliver said control signal to said voice coil motor such that said first velocity profile is limited such that said ramp tab does not hit said crash stop at a velocity which might cause mechanical damage to said disk drive when said disk drive loses power while a seek is in progress,

wherein said first velocity profile is derated by a variable amount,

wherein said variable amount is determined according to at least one of said target track, a power supply voltage, a temperature, a spindle motor back electromotive force, and a positioner gain, and

wherein said variable amount is calculated according to the equation:

$$Derate\_factor = \frac{(\max\_track - tgt\_track)^2 \times 127}{2^{26} \times \sqrt{2a}} + 0.5$$

where *max_track* is the number of a track with a predefined relationship to said ramp, *tgt_track* is the number of the target track, and a is the deceleration of said transducer.

20. (previously presented) A disk drive, as claimed in claim 19 wherein said first velocity profile is further limited according to the following equation:

$$Warp\_factor = \sqrt{2a} \times \sqrt{(1 + Kwarp \times Vel) \times xtg}$$

where a is the deceleration of said transducer, *Vel* is the velocity of said transducer, *xtg* is the distance from said starting track to said target track, and *kwarp* is a variable determined by an amount of back electromotive force available from said voice coil motor during deceleration of said actuator arm.

21. (previously presented) A method for changing radial position of a transducer relative to a rotating storage medium from a starting track to a target track, comprising:

determining a desired velocity profile for said transducer as a function of radial position of said transducer, said velocity profile including at least an acceleration portion and a deceleration portion;

adjusting at least said deceleration portion of said velocity profile based on at least a direction of travel of said transducer; and

moving said transducer from said starting track to said target track during normal non-park operations, in accordance with said velocity profile.

22. (previously presented) A method, as claimed in claim 21, wherein said adjusting step includes:

determining a direction of travel of said transducer from said target track to a maximum track; and

derating at least said deceleration portion of said velocity profile when said direction of travel is toward said maximum track.

23. (original) A method, as claimed in claim 22, wherein:

said maximum track is located near an inner diameter of said rotating storage medium.

24. (original) A method, as claimed in claim 22, wherein:

said maximum track is located near an outer diameter of said rotating storage medium.

25. (original) A method, as claimed in claim 21, wherein said adjusting step includes:

determining a first distance from said target track to a maximum track;

determining a velocity that said transducer will achieve;

determining a direction of travel of said transducer; and

derating said velocity profile when said first distance is less than a first predetermined number, said velocity is greater than a maximum safe velocity, and said direction of travel is toward said maximum track.

26. (original) A method, as claimed in claim 25, wherein:

said derating step includes adjusting at least said deceleration portion by a predetermined amount.

27. (original) A method, as claimed in claim 26, wherein:

said predetermined amount is 50 percent of a current available for said deceleration portion.

28. (original) A method, as claimed in claim 25, wherein:

said derating step includes adjusting at least said deceleration portion by a variable amount.

29. (original) A method, as claimed in claim 28, wherein said variable amount is determined according to at least one of said target track, a power supply voltage, a temperature, a spindle motor back electromotive force, and a positioner gain.

30. (previously presented) A method for changing radial position of a transducer relative to a rotating storage medium from a starting track to a target track, comprising:

determining a desired velocity profile for said transducer as a function of radial position of said transducer, said velocity profile including at least an acceleration portion and a deceleration portion;

adjusting at least said deceleration portion of said velocity profile based on at least a direction of travel of said transducer; and

moving said transducer from said starting track to said target track in accordance with said velocity profile, wherein said adjusting step includes:

determining a first distance from said target track to a maximum track;

determining a velocity that said transducer will achieve;

determining a direction of travel of said transducer; and

derating said velocity profile when said first distance is less than a first predetermined number, said velocity is greater than a maximum safe velocity, and said direction of travel is toward said maximum track,

wherein said derating step includes adjusting at least said deceleration portion by a variable amount,

wherein said variable amount is determined according to at least one of said target track, a power supply voltage, a temperature, a spindle motor back electromotive force, and a positioner gain, and

wherein said variable amount is a derate factor determined by the equation:

$$Derate\_factor = \frac{(\max\_track - tgt\_track)^2 \times 127}{2^{26} \times \sqrt{2a}} + 0.5$$

where *max_track* is the number of the maximum track, *tgt_track* is the number of the target track, and *a* is the deceleration of the transducer according to said deceleration portion of said seek velocity profile.

31. (original) A method, as claimed in claim 29, wherein:

said derating step further includes calculating a warping factor and applying said warping factor to said velocity profile.

32. (original) A method, as claimed in claim 31, wherein:

said warping factor is determined based on at least one of said first distance and a back electromotive force of a voice coil motor during said deceleration portion.

33. (previously presented) A method for changing radial position of a transducer relative to a rotating storage medium from a starting track to a target track, comprising:

determining a desired velocity profile for said transducer as a function of radial position of said transducer, said velocity profile including at least an acceleration portion and a deceleration portion;

adjusting at least said deceleration portion of said velocity profile based on at least a direction of travel of said transducer; and

moving said transducer from said starting track to said target track in accordance with said velocity profile, wherein said adjusting step includes:

determining a first distance from said target track to a maximum track;

determining a velocity that said transducer will achieve;

determining a direction of travel of said transducer; and

derating said velocity profile when said first distance is less than a first predetermined number, said velocity is greater than a maximum safe velocity, and said direction of travel is toward said maximum track,

wherein said derating step includes adjusting at least said deceleration portion by a variable amount,

wherein said variable amount is determined according to at least one of said target track, a power supply voltage, a temperature, a spindle motor back electromotive force, and a positioner gain,

wherein said derating step further includes calculating a warping factor and applying said warping factor to said velocity profile,

wherein said warping factor is determined based on at least one of said first distance and a back electromotive force of a voice coil motor during said deceleration portion, and

wherein said warping factor is determined according to the following equation:

$$Warp\_factor = \sqrt{2a} \times \sqrt{(1 + Kwarp \times Vel) \times xtg}$$

where *a* is the deceleration of said transducer according to said deceleration portion of said seek velocity profile, *vel* is the velocity of the transducer, *xtg* is the distance between said starting track and said target track, and *kwarp* is a variable determined by the amount of said back electromotive force.

34. (previously presented) A disk drive, comprising:

a storage disk having a plurality of concentric tracks for storing data including at least a first track located at an outer diameter of said storage disk and a second track located at an inner diameter of said storage disk;

a spindle motor for rotating said storage disk;

an actuator arm assembly having a transducer for reading data from said storage disk and a ramp tab;

a ramp operable to engage said ramp tab and prevent said transducer from contacting said storage disk when said storage disk is not rotating;

a voice coil motor operable to move said actuator arm relative to said disk in response to a control signal; and

a controller operable to generate said control signal and deliver said control signal to said voice coil motor such that said actuator arm moves in a direction from a starting track to a target track according to a seek velocity profile for use during normal non-park operations, wherein said seek velocity profile includes at least an acceleration portion and a deceleration portion, and said seek velocity profile is derated based on at least a direction of travel of said actuator arm.

35. (previously presented) The disk drive, as claimed in claim 34, wherein:

at least said deceleration portion of said seek velocity profile is derated by a factor of 0.5 when said actuator arm moves toward said ramp and said target track is within a predefined distance from said ramp.

36. (original) The disk drive, as claimed in claim 35, wherein:

at least said deceleration portion of said seek velocity profile is derated by a variable amount when said actuator arm moves toward said ramp and said target track is within a predefined distance from said ramp.

37. (original) The disk drive, as claimed in claim 36, wherein:

said variable amount is determined based on at least one of said target track, a power supply voltage, a temperature, a spindle back electromotive force, and a positioner gain.

38. (previously presented) A disk drive, comprising:

a storage disk having a plurality of concentric tracks for storing data including at least a first track located at an outer diameter of said storage disk and a second track located at an inner diameter of said storage disk;

a spindle motor for rotating said storage disk;

an actuator arm assembly having a transducer for reading data from said storage disk and a ramp tab;

a ramp operable to engage said ramp tab and prevent said transducer from contacting said storage disk when said storage disk is not rotating;

a voice coil motor operable to move said actuator arm relative to said storage disk in response to a control signal; and

a controller operable to generate said control signal and deliver said control signal to said voice coil motor such that said actuator arm moves in a direction from a starting

track to a target track according to a seek velocity profile, wherein said seek velocity profile includes at least an acceleration portion and a deceleration portion, and said seek velocity profile is derated based on at least a direction of travel of said actuator arm,

wherein at least said deceleration portion of said seek velocity profile is derated by a variable amount when said actuator arm moves toward said ramp and said target track is within a predefined distance from said ramp,

wherein said variable amount is determined based on at least one of said target track, a power supply voltage, a temperature, a spindle back electromotive force, and a positioner gain, and

wherein said variable amount is a derate factor determined by the equation:

$$Derate\_factor = \frac{(\max\_track - tgt\_track)^2 \times 127}{2^{26} \times \sqrt{2a}} + 0.5$$

where *max_track* is the number of a track with a predetermined relationship to said ramp, *tgt_track* is the number of the target track, and *a* is the deceleration of said transducer during said deceleration portion of said seek velocity profile.

39. (original) The disk drive, as claimed in claim 38, wherein:

max_track is the number of said second track when said ramp is located at said inner diameter of said storage disk.

40. (original) The disk drive, as claimed in claim 38, wherein:

max_track is the number of said first track when said ramp is located at said outer diameter of said storage disk.

41. (original) A disk drive, as claimed in claim 37, wherein said variable amount also includes a warping factor based on at least one of a seek length and a back electromotive force of said voice coil motor.

42. (previously presented) A disk drive, comprising:

a storage disk having a plurality of concentric tracks for storing data including at least a first track located at an outer diameter of said storage disk and a second track located at an inner diameter of said storage disk;

a spindle motor for rotating said storage disk;

an actuator arm assembly having a transducer for reading data from said storage disk and a ramp tab;

a ramp operable to engage said ramp tab and prevent said transducer from contacting said storage disk when said storage disk is not rotating;

a voice coil motor operable to move said actuator arm relative to said disk in response to a control signal; and

a controller operable to generate said control signal and deliver said control signal to said voice coil motor such that said actuator arm moves in a direction from a starting track to a target track according to a seek velocity profile, wherein said seek velocity profile includes at least an acceleration portion and a deceleration portion, and said seek velocity profile is derated based on at least a direction of travel of said actuator arm,

wherein at least said deceleration portion of said seek velocity profile is derated by a variable amount when said actuator arm moves toward said ramp and said target track is within a predefined distance from said ramp,

wherein said variable amount is determined based on at least one of said target track, a power supply voltage, a temperature, a spindle back electromotive force, and a positioner gain,

wherein said variable amount also includes a warping factor based on at least one of a seek length and a back electromotive force of said voice coil motor, and

wherein said warping factor is determined according to the equation:

$$Warp\_factor = \sqrt{2a} \times \sqrt{(1 + Kwarp \times Vel) \times xtg}$$

where a is the deceleration of said transducer according to said deceleration portion of said seek velocity profile, Vel is the velocity of said transducer, xtg is the distance from said starting track to said target track, and $kwarp$ is a variable determined by an amount of back electromotive force available from said voice coil motor during said deceleration portion of said seek velocity profile.

43. (previously presented) A disk drive, comprising:

storage means for storing data;

rotation means for rotating said storage means;

read/write means for reading and writing data to said storage means;

actuation means for moving and read/write means from a starting location to a target location within said storage means; and

control means for controlling said actuation means such that said actuation means move said read/write means according to a first velocity profile for use during normal non-park operations, when said starting location is a first direction from said target location, and according to a second velocity profile, different from said first velocity

profile, when said starting location is a second direction from said target location and said target location is within a predefined distance from a reference location within said storage means.

44. (original) The disk drive, as claimed in claim 43, wherein:

said reference location is located at an inner diameter of said storage means.

45. (original) The disk drive, as claimed in claim 43, wherein:

said reference location is located at an outer diameter of said storage means.

46. (original) The disk drive, as claimed in claim 43, wherein:

at least a deceleration portion of said second velocity profile is derated by a predefined factor of said first velocity profile.

47. (original) The disk drive, as claimed in claim 46, wherein:

said predefined factor is one-half.

48. (original) The disk drive, as claimed in claim 43, wherein:

said second velocity profile is derated by a variable factor of said first velocity profile.

49. (previously presented) The disk drive, as claimed in claim 48, wherein:

said variable factor is determined based on at least one of said target location, a power supply voltage, a temperature, a back electromotive force of said rotation means, and a positioner gain.

50. (previously presented) A disk drive, comprising:

storage means for storing data;

rotation means for rotating said storage means;

read/write means for reading and writing data to said storage means;

actuation means for moving and read/write means from a starting location to a target location within said storage means; and

control means for controlling said actuation means such that said actuation means move said read/write means according to a first velocity profile when said starting location is a first direction from said target location, and according to a second velocity profile when said starting location is a second direction from said target location and said target location is within a predefined distance from a reference location within said storage means,

wherein said second velocity profile is derated by a variable factor of said first velocity profile, and

wherein said variable factor is determined according to the following equation:

$$Derate\_factor = \frac{(ref\_loc - tgt\_loc)^2 \times 127}{2^{26} \times \sqrt{2a}} + 0.5$$

where *ref_loc* is the number of the reference location, *tgt_loc* is the number of the target location, and *a* is the deceleration of said read/write means during a deceleration portion of said second velocity profile.

51. (original) The disk drive, as claimed in claim 49, wherein:

said variable factor is further determined based on a warping factor, wherein said warping factor is determined based on at least one of a seek length and a back electromotive of said actuation means.

52. (previously presented) A disk drive, comprising:

storage means for storing data;

rotation means for rotating said storage means;

read/write means for reading and writing data to said storage means;

actuation means for moving and read/write means from a starting location to a target location within said storage means; and

control means for controlling said actuation means such that said actuation means move said read/write means according to a first velocity profile when said starting location is a first direction from said target location, and according to a second velocity profile when said starting location is a second direction from said target location and said target location is within a predefined distance from a reference location within said storage means,

wherein said second velocity profile is derated by a variable factor of said first velocity profile,

wherein said variable factor is determined based on at least one of said target location, a power supply voltage, a temperature, a back electromotive force of said rotation means, and a positioner gain, and

wherein said warping factor is determined according to the following equation:

$$Warp\_factor = \sqrt{2a} \times \sqrt{(1 + Kwarp \times Vel) \times xtg}$$

where *a* is the deceleration of said read/write means during said deceleration portion of said second velocity profile, *Vel* is the velocity of said read/write means, *xtg* is the distance from said starting location to said target location, and *kwarp* is a variable determined by an amount of back electromotive force available from said actuation means during said deceleration portion of said second velocity profile.